

Scientific writing

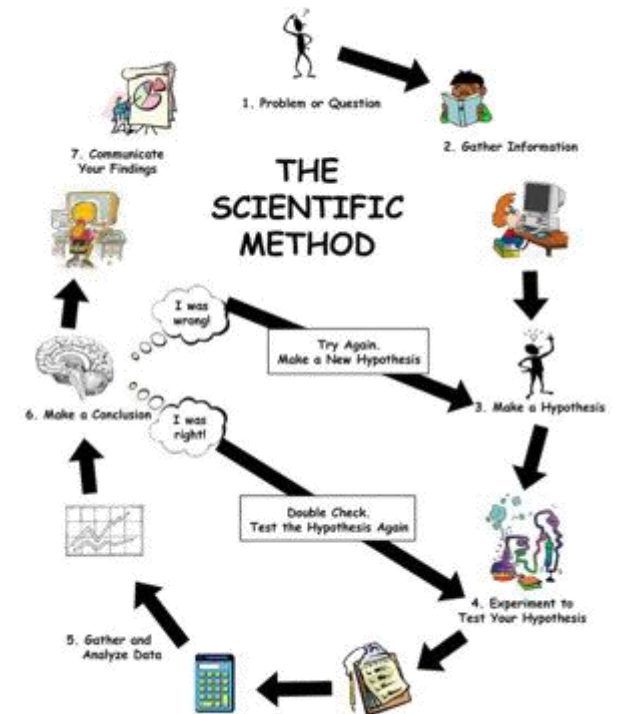
Introduction for Nanostudents

Why is writing important for science

Communication is the START of the scientific critical evaluation and the incorporation of your findings into the scientific community.

Basis for discussion in the scientific community (your research group and colleagues, narrow field of international colleagues, general scientific community, general audience)

Ongoing debate on how best to do this... (referee system, open access, open data, open source, etc.)



Problem

We are taught to write formally.....

We are taught to write organized....

Creating value

We need to write persuasive and create value.

If you don't know who you are writing for chances are very low you will create value.

If you do not get your reader engaged – nobody will read your manuscript → **No value.**

Who are you writing for and why?

- Audience #1: Scientists / Peers: For them to learn and solve their problems.
- Audience #2: Reviewers: Gatekeepers preventing your paper to be published.



Reading

Read papers from your own field and pay attention on how they sell the story...

Different journals require different writing styles.

Make a list of good “dictionary” of sentences taken from scientific publications.

Diversify the vocabulary you use.

A common method to.... enhance
More compatible
Indicating important contributions
Minuscule improvements
Underlying mechanism
Nanomolecular
Maximising ... some phenomena
x... to y ... times stronger / weaker ...
allowing sufficient x phenomena ...
difficult and uncretain interface ..
which exploits ...
a standard analytical tool for assessment of x... y....
Something implies....
We attribute x ... to y
X is consistent with y properties....
May indicate a lesser ... larger... contribution to x... or y...
Some measurement provides information regarding
XY is expected to improve / decrease
Characterising something and thereby..... distinguish
Characteristic shapes, structures and properties that arise from x.y..
Our findings demonstrate....
Mode +- based on x , or y
XY information was extracted from XY measurement
We can understand the build up of ...
The cessation of something suggests....
The emergent nanotechnological pheomena
Although this observation indicates
Collectively these results provide insight



Don't plagiarize!

Start collecting interesting papers while reading. You will reference them later.

How to search for literature

Search engines: Google, Google Scholar, Pubmed, Web of knowledge.

Pro-tips:

Cross referencing. Search engines now let you find papers citing the original paper. Always give a glance at the references of the paper you are reading.



The screenshot shows two search results. The first result is a HTML document titled "How to write and publish scientific papers" by RA Day (1998) from SciELO Brasil. It includes a snippet of text and a citation count of 1957, which is circled in red. The second result is a PDF document titled "The science of scientific writing" by GD Gopen and JA Swan (1990) from usenix.org. It includes a snippet of text and a citation count of 459, which is also circled in red.

[HTML] How to write and publish **scientific papers** [HTML] scielo.br
RA Day - 1998 - SciELO Brasil
... to convey our ideas and impart information. Thus, it is not surprising that several authors have dedicated themselves to the production of works that deal with **scientific writing**. Perhaps the earliest example of a book teaching ...
☆ **Cited by 1957** Related articles All 31 versions ⌕

[PDF] The science of **scientific writing** [PDF] usenix.org
GD Gopen, JA Swan - American Scientist, 1990 - usenix.org
Science is often hard to read. Most people assume that its difficulties are born out of necessity, out of the extreme complexity of **scientific** concepts, data and analysis. We argue here that complexity of thought need not lead to impenetrability of expression; we ...
☆ **Cited by 459** Related articles All 180 versions ⌕

Referencing software: Zotero, Mendeley, endnote, Evernote, personal notes.

Why do we write a paper?

- Sharing your idea and helping others do research!
- Helping you to do research! Writing helps you think.

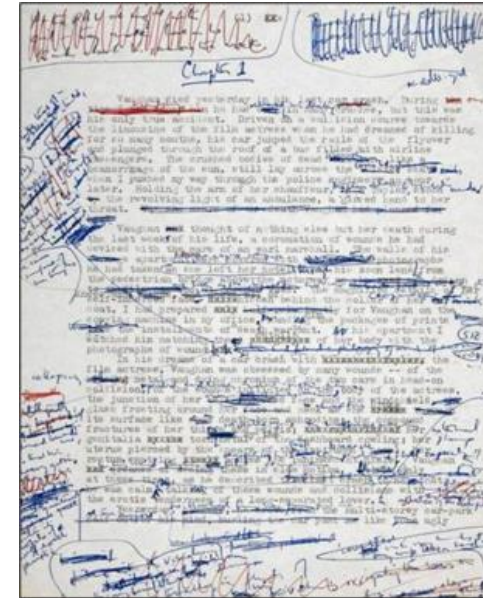
Idea → Do research → Write a paper

- Idea → Start writing paper → Do research
- Start with draft 0, even if it is an outline.

What is your idea? How are you going to prove it? Which experiments do you need and why?

- **General rules:** When writing set time aside just for this. Get out of the lab.

Pro-tip: Use mynoise.com for background noise while writing.





Questions?

Before starting

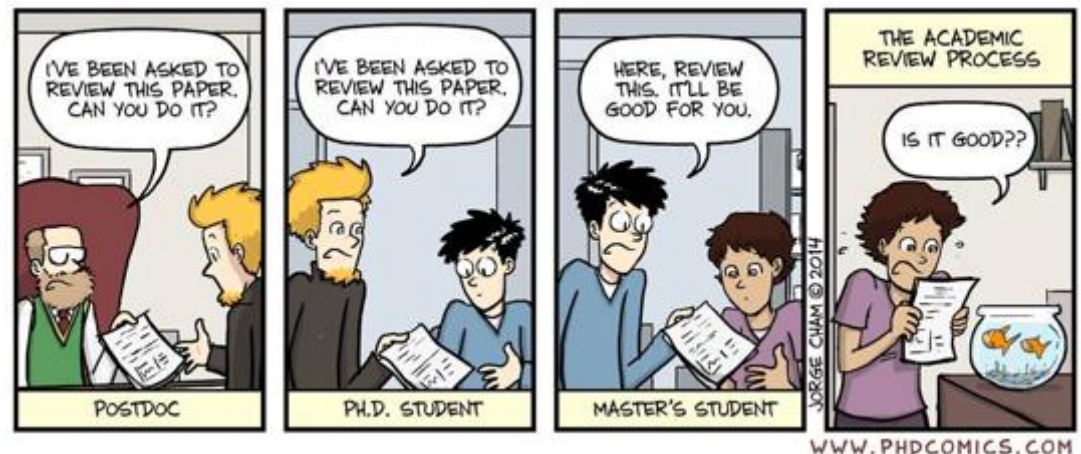
Who is the targeted reader?

Story and reasoning should be understandable.

Be aware: your writing will be scrutinized by experts and will be around for a very long time

Good writing (short, direct, clear, etc) increases the success of a publication.

Hint for the Block courses: consider your colleagues and supervisors as your readers and ask them for feedback **BEFORE / DURING and AFTER** writing (beyond the mark)!



General style suggestions

Objective and clear language

Typically quite technical

No contractions (don't, won't, ect)

Introduce abbreviations once, then use them consistently.

Uniformity and consistency (refs, figs, tabs) keep the same formats, style, size, fonts.

Keep track of your tenses.

Pro-tip: <https://www.grammarly.com/>, <http://www.hemingwayapp.com/>

Hemingway App makes your writing bold and clear.

The app highlights lengthy, complex sentences and common errors; if you see a yellow sentence, shorten or split it. If you see a red highlight, your sentence is so dense and complicated that your readers will get lost trying to follow its meandering, splitting logic — try editing this sentence to remove the red.

You can utilize a shorter word in place of a purple one. Mouse over them for hints.

Adverbs and weakening phrases are helpfully shown in blue. Get rid of them and pick words with force, perhaps.

Phrases in green have been marked to show passive voice.

You can format your text with the toolbar.

Paste in something you're working on and edit away. Or, click the Write button and compose something new!

Structure of your report

- Title
- Abstract
- Figures

Main text:

- Introduction
- (Theory)
- Materials and Methods
- Results and Discussion
- Conclusions and outlook
- Acknowledgements and References

Before setting out:

Pick a style. Look at different journals, and which styles they use. Pick one. Stick to it!

Title

Usually invented at the end.
Be bold & try to use some humor

Ashes to Ashes: Thermal Contact Burns in Children Caused by Recreational Fires.

An Unusual Penpal: Case Report and Literature Review of Posterior Urethral Injuries
Secondary to Foreign Body Insertion

A Lucky Catch: Fishhook Injury of the Tongue.

"Here's Egg in Your Eye": A Prospective Study of Blunt Ocular Trauma Resulting From Thrown
Eggs.

Children and Mini-Magnets: An Almost Fatal Attraction.

Abstract

Summarizes the work. Normally 200 words.

State the problem.

State why it is an interesting problem / question.

State what you discovered and how it solves the problem / question.

State what follows your solution.

Keep it short.

Don't repeat the abstract in the introduction.

A "Rose Is a Rose Is a Rose Is a Rose," but Exactly What Is a Gastric Adenocarcinoma?

Nifty Ways to Leave Your Lover: The Tactics People Use to Entice and Disguise the Process of
Human Mate Poaching.

You Probably Think This Paper's About You: Narcissists' Perceptions of Their Personality and
Reputation.

Carbon Monoxide: To Boldly Go Where NO Has Gone Before.

Introduction

- Keep the reader engaged.
- **Do NOT focus on background. Max 1-2 sentences, with references.**
- **Use it as a launchpad to explain your work.**
- Your goal is to give a menu – describe the reader what they will get if they read the work.
- What is the general question in this field (this depends strongly on the targeted reader)
- What is missing (gap)?
- How will you fill this gap?
- Your hypothesis or concrete research question and how you want to get there.

Results and Discussion

Results and discussion used to be separated. Now they are mostly connected.

What were you investigating → How did you set the experiments → What did you find out and why is it important

Objective presentation of results (at least think about errors)

Represent the key points of your results with figures and tables

Answer the research question posed in the introduction

Discuss critically your own findings (what else could «it» be? Is this the only explanation? Etc.)

Give explanations for what went wrong

Don't explain dead ends of your technical work.

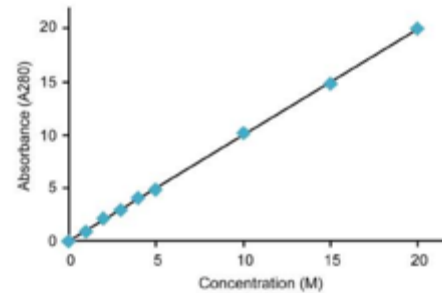
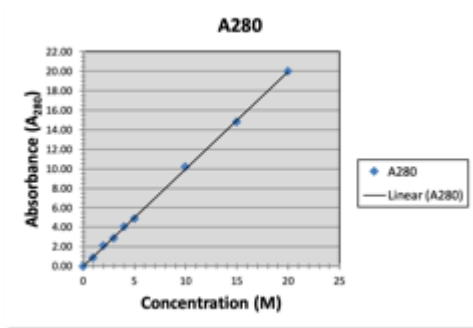
Only explain failed experiments if it was not intuitive that they will fail.

Figures & Illustrations

Figures and illustrations are the most important parts in publications in the natural sciences!

Tell the story in figures!

Figures contain key information of your story and advertise your report
Prepare your own figures and get good at preparing them!



Pro-tip:

Tips and tricks for scientific figures: <https://www.sciencefarts.com/figures.html>, <https://www.aje.com/dist/docs/Guide-Creating-Effective-Scientific-Figures-for-Publication.pdf>

Good quality, colors are often useful. <https://colors.co/app>, <https://paletton.com>

Figures & Illustrations

RETURN TO ISSUE | < PREV ARTICLE NEXT >

Self-Assembled Vesicles Prepared from Amphiphilic Cyclodextrins as Drug Carriers

Tao Sun[†], Qie Guo[§], Cai Zhang[§], Jingcheng Hao[†], Pengyao Xing[†], Jie Su[†], Shangyang Li[†], Aiyou Hao^{**} and Guangcun Liu^{**}

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<https://doi.org/10.1021/la301497t>
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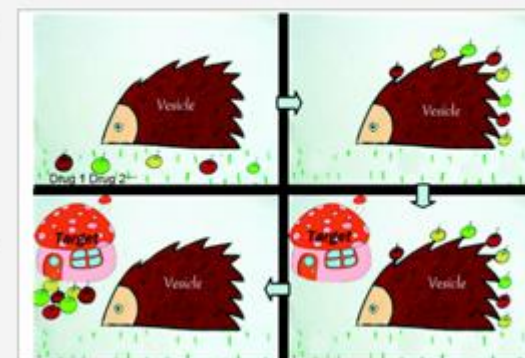
PDF (4 MB)



SI Supporting Info (1) »

Abstract

Controlled self-assembly of amphiphilic cyclodextrin is always a challenging topic in the field of supramolecular chemistry, since it provides the spontaneous generation of well-defined aggregation with functional host sites with great potential applications in drug-carrier systems. β -Cyclodextrin modified with an anthraquinone moiety (**1**) was successfully synthesized. In the aqueous solution, **1** was found able to self-assemble into vesicles, which was characterized in detail by TEM, SEM, EFM, and DLS. The formation mechanism of the vesicles was suggested based on the 2D ROESY and UV-vis results, and further verified by the MD simulation. Subsequently, the stimuli response property of the vesicles, including to Cu^{2+} and H^+ , was also studied. The vesicles can efficiently load Paclitaxel inside the membrane with functional macrocyclic cavities available, which can further carry small molecules, such as ferrocene. The vesicles loading with Paclitaxel have remarkable anticancer effects. This work will provide new strategy in drug-carrier systems and tumor treatment methods.



Materials and methods

- Appropriate indication of materials and measurement equipment (use references instead of repeating what others have done)
- Make sure that you and others (colleagues, successors, ...) will be able to repeat the experiment or understand your analysis also in 100 years!
- A recipe is a recipe – but the materials might change. If somebody fails to replicate your experiments engage in a dialogue, and try to figure out what is different.



Summary and Outlook

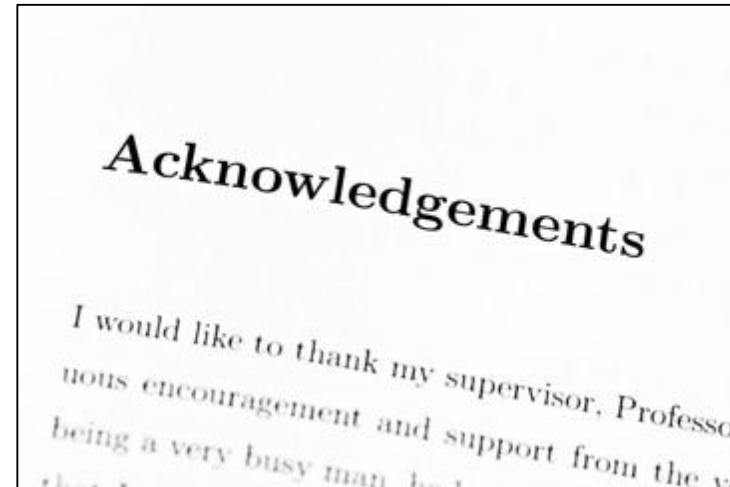
Short summary of your findings. Put your findings into context.

Speculate, how your results will be important for future research!

(this is the only part where speculation is allowed, but do not make a fool of yourself!)

Acknowledgement

- All involved people
- Head of the group followed by the assistants.
- Institutions
- Funding agencies
- Mention framework of the block courses



When referring to others...

Fallacy: To make my work good look I have to make other work look bad. - Wrong.
Not acknowledging important related work will kill your paper.

Right: In order to make our solution look good we should give credit to the good work already done.
Standing on the shoulders of giants.

The revision

Start sending your draft to your PI as soon as possible, in order to clarify expectations.

Get your paper read by others

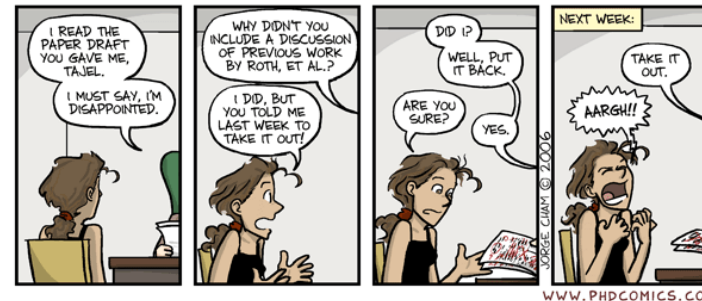
Experts – Good, but usually don't have time.

Non experts – Also very good, and usually take time.

Pro-tips:

Find a native English speaker.

When getting help: Explain exactly what you want from the person. Otherwise you will get a spellcheck.



The revision

- Every draft has to be revised over and over again! There is no way around it!
- Check first the structure of the report
- Read everything completely, make only minor notes...
- (act the prospective reader)
- Are the story and the «flow» ok?
- THEN you revise (iterative process) and THEN you work out the text
- The publication directly reflects you and your abilities

Polishing

- Start checking grammar, orthography etc...
- Select specific words, etc.
- Check draft step by step (checklist)
- Try to shorten and clarify everything
- This step shows if you worked carefully or if you ran out of time!
- Again: **The report directly reflects you and your abilities**
- Rest after finishing and revise again...



**WAX ON,
WAX OFF.**

Submission

- At some point you are done.
- Stop checking the manuscript and get it out there! It has no use only on your hard drive.
- It will never be perfect. Don't worry.

Questions?

Final remarks

Take home messages:

- For whom am I writing?
- Report structure parallels the work flow
- Writing is an important element of doing research.

Most of the rest is suggestions for your convenience.